

TFM 2022-2023

Title

On the edge deep vision system for the efficient and precise detection of workpiece markings.

Description

The project is framed within the research group of design and precision engineering which is focussed on the machine precision and the results. Within the precision, the measurement of the workpieces by artificial vision is a key factor which allows the study of the machines and workpieces in a non destructive way.

Within the research group, high precision multi-camera tracking systems have been developed to follow and locate objects in the industrial setting. However, with a view to improving the speed and precision of these systems, a solution based on *edge computing* and deep neural networks is being worked on. Jetson Orin is being used as the main device where this TFM is marked. These advances will facilitate the processing of large quantities of data, thus making a significant improvement in the speed and precision of these multi-camera tracking systems.

In order to achieve the aforementioned objectives, an exhaustive analysis and optimization of available data must be carried out for the study of the reconstruction techniques by neural networks. The identification and selection of the data and network architecture will be done so as to maximise the precision and efficiency of the models implemented. Likewise, different neural network optimization techniques will be evaluated to improve the computational efficiency and performance of the models suggested in the devices proposed.

In short, the project will encompass the study and development of a detection system of *on the edge* markings focussed on computational efficiency and precision. This will require the study of large quantities of labelled data, the selection of optimum resolution strategies, implementation, trial and optimization of the chosen architectures, as well as the realisation of the results validation.